

Title of the Invention

MOBILE PHONE

Inventors

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MOBILE PHONE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a mobile phone which processes image information fed from a camera.

For example, as is described in Japanese Patent Application 10-212022 (JP-A-2000-29988) (electronic camera and operation control method thereof), there has been suggested a method for cutting out a character string contained in an image obtained by an electronic camera and storing the character string into a storage medium such as a memory card.

Moreover, as is described in Japanese Patent Application 7-117292 (JP-A-8-116476) (recording apparatus having a video camera), a method is known for separating a VTR portion having a display and a camera portion so that a picture can be taken using a liquid crystal display of the VTR portion as an electronic view finder even when the camera portion is separated from the VTR portion.

According to the conventional method, a character string contained in an image taken by the camera is converted into text data, which is correlated with an image when stored, and has no relationship, for example, with communication by a mobile phone, mail, Internet connection, or face identification.

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Moreover, in a recording apparatus having a video camera separated from a VTR portion, the camera portion is connected to the VTR portion via a cable, which may disturb operation.

5 SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a mobile phone facilitating operation by using an image taken by a camera for communication and mail through the mobile phone,
10 Internet connection, face search, and the like.

It is another object of the present invention to provide a mobile phone enabling communication between a camera and an apparatus main body arranged at a short distance so as to improve the operation
15 condition.

In order to achieve the aforementioned objects, a camera portion is made detachable from a main body and a short distance wireless communication control module is provided in both of them, so that
20 image information fed from the camera portion is transferred to the main body by the short distance wireless communication and the transferred image is converted, for example into text data in an image processor arranged in the main body, so as to support
25 as a phone number, an Internet address, mail text, and other information respectively for input of functions such as calling, Internet connection and mail.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A to 1G show configuration of a mobile phone with a camera device according to an embodiment of the present invention.

5 Fig. 2A to 2E show additional functions of the mobile phone with the camera device according to the embodiment of the present invention.

Fig. 3A to 3E show a lock function of the mobile phone with the camera device according to the
10 embodiment of the present invention.

Fig. 4 shows wired networking between cables of the mobile phone with the camera device according to the embodiment of the present invention.

Fig. 5A to 5F show a symmetric shape of the
15 mobile phone with the camera device according to the embodiment of the present invention.

Fig. 6A and 6B show an operation example of the mobile phone with the camera device according to the embodiment of the present invention.

20 Fig. 7A and 7B show a flow of the mobile phone with the camera device according to the embodiment of the present invention.

Fig. 8A to 8C show phone number reading routine of the mobile phone with the camera device
25 according to the embodiment of the present invention.

Fig. 9A to 9D show an URL reading routine of the mobile phone with the camera device according to the embodiment of the present invention.

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Fig. 10A and 10B show a translation routine of the mobile phone with the camera device.

Fig. 11A to 11C show a related information search routine of the mobile phone with the camera device according to the embodiment of the present invention.

Fig. 12A to 12C show a handwritten memo reading routine of the mobile phone with the camera device according to the embodiment of the present invention.

Fig. 13A to 13G show a key-image recognition routine of the mobile phone with the camera device.

Fig. 14A to 14E show a face search routine of the mobile phone with the camera device according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENT

Description will now be directed to an embodiment of the present invention with reference to the attached drawings.

[1] Configuration of the Mobile Phone (with a camera device)

Fig. 1 shows configuration of the mobile phone with a camera device according to the present invention. Fig. 1A is a front view when the camera device is mounted on the main body; Fig. 1B is a side view; Fig. 1C is a rear view of the main body 110 and the camera device 120; Fig. 1D is a front view of the

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camera device; and Fig. 1E is a front view of the main body. The main body 111 includes a display and a set of buttons 112. for entering phone numbers and the like. The camera device 113 includes a speaker unit 5 113, a microphone 114, an up-down right-left cursor/enter button 115, and a camera 116 attached to the rear surface of the camera device.

Fig. 1F shows configuration of the main body. A CPU 150, a memory 151, an image in-take block 152,, a 10 video output block 153, a short-distance wireless control module 154, a network module 155, a power source 156 and an image processor 152 are provided inside the main body. The aforementioned display 160 and the button 161 are arranged on the front surface 15 of the main body.

Fig. 1G shows configuration of the camera device. A short-distance wireless control module 170 and a power source 171 are provided inside the camera device. The aforementioned speaker unit 180, the 20 microphone 181 and the cursor keys 182 are arranged on the front surface of the camera device and the camera 183 is arranged on the rear surface.

In the mobile phone with the camera according to the present invention, the camera device can be 25 detached from the main body and can be operated in both cases when the camera device is mounted and when detached.

When the camera device is mounted on the main

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body, by using the button 112 and the display 111 of
the main body and the speaker unit 113 and the
microphone of the camera device, it is possible to
perform calling, mail sending, and the Internet
5 connection like in a normal mobile phone. Moreover,
after taking a picture by using the camera 116 attached
to the rear surface of the camera device, or after
performing character recognition from an image taken in
the image processor 157, it is possible to activate
10 applications such as information search and
translation.

When the camera device is detached from the
main body, by using the cursor key of the camera
device, it is possible to search a phone number from
15 the phone number list stored in the memory 151 of the
main body and perform calling from the speaker unit and
the microphone of the camera device via the short-
distance wireless control module 170 of the camera
device and the short-distance wireless control module
20 154 of the main body. Moreover, via the short-distance
wireless control modules of the camera device and the
main body, an image taken by the camera 116 of the
camera device is transferred to the memory 151 of the
main body. For example, a picture can easily be taken
25 by holding the main body with a user left hand and the
camera device with his right hand.

[2] Additional functions

Fig. 2 shows additional functions that can be

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added to the mobile phone with the camera according to the present invention.

Fig. 2A shows an example in which an antenna 201 and a network module are added to the camera device 5 of Fig. 1. By transferring the communication function from the main body to the camera device, it is possible to perform calling without placing the main body in the vicinity.

Fig. 2B shows an example in which a speaker 10 unit 211 and a microphone 212 are added to the main body of Fig. 1, too.

Fig. 2C shows terminals (221 and 222) which are in contact with each other when the camera device is mounted on the main body. With these terminals 15 through which current flows when the camera device is mounted on the main body, for example, it is possible to transfer power from the power source of the main body to the camera device, and when the camera device is detached from the main body, information can be 20 passed through the terminals instead of a short-distance wireless communication, thereby saving the power consumption.

Fig. 2E shows an example in which a small-type display is attached to the camera device. In the 25 camera device, for example, it becomes possible to easily search a phone number from the phone number list of the main body.

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[3] Stopper function

By referencing Fig. 3, explanation will be given on a function to prevent fall when the camera device is mounted on the main body in the
5 aforementioned mobile phone with the camera according to the present invention.

Fig. 3A and Fig. 3B show an example in which a magnet or a magic tape is attached to the portions (231 and 232) which are brought into contact when the
10 camera device is mounted on the main body.

Fig. 3C shows an example in which the main body and the camera device are both have holes (351 and 352) for passing a string-shaped strap 353 through.

Fig. 3D shows an example in which a wedge-
15 shaped stopper 250 is provided. Fig. 3E shows it enlarged. The upper drawing in Fig. 3E shows a case when the camera device is detached and the lower drawing Fig. 3E shows a case when the camera device is mounted on the main body. The wedge-shaped stopper 255
20 in inserted via a portion 251 into the hole 252 of the camera device, thereby fixing the camera device to the main body. Moreover, a terminal as described with reference to Fig. 2C and Fig. 2D for power supply when the camera device is mounted on the main body is
25 provided at the tip of the wedge 255 and at the depth of the hole 252, so as to perform signal transmission/reception between the camera device and the main body and charging as well.

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[4] Wired networking

Fig. 4 shows wired networking using a cable for signal transmission/reception without using the short-distance wireless control modules in the mobile phone with the camera device according to the present invention described in Fig. 1. In general, wireless networking requires a large power consumption load and there is a problem that continuous use time is shortened when the power source is small. Accordingly, when no wireless networking is required, a communication cable 272 is used for connecting the signal line connection terminal 270 provided on the rear surface of the main body to the connection terminal 271 of the camera device, thereby performing signal transmission/reception via the wired networking, so as to save the power consumption.

[5] Symmetry

Referring to Fig. 5, explanation will be given on the symmetric shape when the camera device is mounted on the main body in the mobile phone with the camera device described with reference to Fig. 1.

Fig. 5A and Fig. 5B show the camera device which is symmetric in the up-down direction and can be mounted on the main body upside down. In this case, two pairs of connection terminals are arranged at the symmetric positions and it can be known whether the camera device is mounted in the correct direction or the reverse direction, thereby, for example, enabling

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signal incoming during the correct direction and
disabling signal incoming during the reverse direction.

Fig. 5C shows a symmetric shape in the front-
rear direction, so that the camera device can be
5 mounted in the reverse direction, i.e., front-side at
rear. Fig. 5D is a side view of the camera device
having the symmetric shape in the front-rear direction.
In this case also, similarly as the aforementioned, two
pairs of connection terminals are arranged at the
10 symmetric positions in the front-rear direction of the
camera device, so as to control the state. Further-
more, when the camera device is mounted in the reverse
direction, for example, it is possible to take a
picture of (capture) a user himself/herself while
15 looking at the display.

Fig. 5E shows an example of an asymmetric
shape in the up-down direction unlike Fig. 5A and Fig.
5B, so that the camera device cannot be mounted on the
main body in the reverse direction.

20 Fig. 5F shows an example of an asymmetric
shape unlike Fig. 5E and Fig. 5D, so that the camera
device cannot be mounted in the reverse direction.

[6] Operation examples

Fig. 6 shows an operation example of the
25 mobile phone with the camera device according to the
present invention described above with reference to
Fig. 1.

Fig. 6A shows an operation example of the

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mobile phone with the camera device according to the present invention described above with reference to Fig. 1.

Fig. 6A shows an operation example when the camera device 402 is mounted on the main body. A sheet of paper 401 having a phone number list is captured and converted into phone number reading text data, so as to be displayed on the display 404 of the main body 403. This operation can be performed when the sheet of paper is in the vicinity of a user.

Fig. 6B shows a similar operation example when the camera device is detached from the main body. This operation is advantageous when a sheet of paper 411 having a phone number list is comparatively far from the user and it is difficult to confirm the picture taken by the camera using the display 414 of the main body 413. For example, the user can move the camera device to the vicinity of the sheet of paper using his/her left hand while holding the main body at a convenient position with his/her right hand. This improves operation procedure.

[7] Processing flow

Fig. 7A shows a processing flow of the mobile phone with the camera device according to the present invention.

Firstly, in step 500, a function menu as shown in Fig. 7B is displayed. A white-black reversed mode represents a mode selected.

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In steps 501, 502, and 503, the user operate the cursor key of the camera device up and down to select a particular mode.

In step 504, when the central portion (enter
5 key) of the cursor key is pressed, control is passed to step 506 and after. Otherwise, control is returned to process 500.

When mode "phone number" is selected in step
506, a phone number reading routine (detailed later) is
10 activated in step 507.

When mode "URL" is selected in step 508, an
ULR reading routine (detailed later) is activated in
step 509.

When a "translation" mode is selected in step
15 510, a translation routine (detailed later) is
activated.

When a "related information search" mode is
selected in step 512, a related information search
routine (detailed later with reference to Fig. 11) is
20 activated in step 513.

When a "mail address" mode is selected in
step 514, a mail address read routine is activated in
step 515.

When a "memo input" mode is selected in step
25 516, a handwritten memo reading routine (detailed later
with reference to Fig. 12) is activated in step 517.

When a "key image" mode is selected in step
518, a key image recognition routine (detailed later

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with reference to Fig. 13) is activated in step 519.

When an "person search" mode is selected in step 520, a person search routine (detailed later with reference to Fig. 14) is activated in step 521.

5 When a "quit" mode is selected, the processing is terminated.

[8] Phone number reading routine

By referring to Fig. 8, explanation will be given on the phone number reading routine.

10 Fig. 8 shows images appearing on the display when the phone number reading routine is activated.

 Firstly, as shown in 550 of Fig. 8A, an image entered from the camera device is displayed on the display screen and when phone numbers are captured, the
15 enter button (OK button) is pressed.

 Fig. 8B shows an image immediately before pressing the enter button.

 Fig. 8C shows characters cut out of the image read in and a phone number portion is recognized,
20 which is converted into font data to display 555. After this, the enter button is pressed, thereby calling the recognized phone number.

[9] URL reading routine

 Referring to Fig. 9, explanation will be
.25 given on the URL reading routine. Fig. 9 shows images displayed when the URL reading routine is activated.

 Firstly, as shown in 570 of Fig. 9A to 572 of Fig. 9B the enter button is continuously pressed to

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take a picture of the URL from head to the bottom by the camera device. When the enter button is released, the taking picture is terminated. In general a character string describing an URL is long in the horizontal direction, a plurality of images are taken in and synthesized into an image of high resolution, thereby improving the character recognition accuracy.

Fig. 9C shows an example of font data converted from the characters recognized, so as to display an URL 574. If the enter button is further pressed in this state, as shown in Fig. 9D, a page of the recognized URL is displayed. Moreover, the downward arrow of the cursor key is pressed to store the URL in the memory.

15 [10] Translation routine

Referring to Fig. 10, the translation routine will be explained. Fig. 10 shows images displayed when the translation routine is activated.

Firstly, as shown in Fig. 10A, an image entered from the camera device is displayed as 600 and when a character string to be translated is captured, the enter button is pressed. When the enter button is pressed, characters contained in the captured image are extracted and converted into text data by a character recognition algorithm. Furthermore, a translated word corresponding to the text data is searched.

Next, as shown in Fig. 10B the text data 602 recognized as the characters and the corresponding term

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603 are displayed on the display screen.

[11] Related information search routine

Referring to Fig. 11, explanation will be given on the related information search routine. Fig.

5 11 shows screen images displayed when the related information search routine.

Firstly, as shown in Fig. 11A, an image input from the camera is displayed as shown by 620 and when a character string to be searched is displayed, the
10 enter button is pressed. When the enter button is pressed, characters contained in the captured image are extracted and converted into text data by the character recognition algorithm. Furthermore, related information for the text data as a keyword is searched
15 using a database in memory or the Internet search engine, so as to create a related information list.

Next, as shown in Fig. 11B, the text data 622 after the character recognition and the related information list 623 are displayed on the screen.

20 Here, an item to be read is selected from the related information list by using the up-down key of the cursor button and the OK (enter) button is pressed, so as to display a detailed database or Internet home page (Fig. 11C).

25 [12] Handwritten memo reading routine

Referring to Fig. 12, explanation will be given on the handwritten memo reading routine. Fig. 12 shows an example of images displayed on the screen when

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the handwritten memo reading routine is activated.

Firstly, as shown in Fig. 12A, an image entered from the camera is displayed as 640 on the screen and when the handwritten memo to be read is captured, a user press the enter button. When the enter button is pressed, characters contained in the image are extracted and converted into text data by the character recognition algorithm. Furthermore, the text data is stored in the memory and a confirmation image is displayed on the screen as shown in Fig. 12B. The handwritten memo can later be transferred to a calculator or used as a text or title of a mail as shown in Fig. 12C.

[13] Key-image recognition routine

Referring to Fig. 13, explanation will be given on the key-image recognition routine. Fig. 13 shows an example of images displayed on the screen when the key-image recognition routine is activated. The key-image represents an image to be used as a password so as to protect the mobile phone, i.e., the mobile phone cannot be used by a person other than the user.

Firstly, as shown in Fig. 13A, a keyimage loading 660 or key-image recognition 661 is selected

When a key-image loading is selected, as shown in Fig. 13B, an image entered from the camera is displayed as shown by 663 on the screen and when a desired image is captured, the user presses the enter button. The image entered is stored in the memory and

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the an image for confirming the loading is displayed on the screen (Fig. 13C), so as to be used for the next key-image recognition.

When the key-image recognition is selected, for example, when an image different from the loaded image is entered (Fig. 13D), as shown in Fig. 13E, a message indicating miss-match is displayed. On the other hand, when a correct image is entered (Fig. 13F), as shown in Fig. 13G, a message indicating a successful matching and, for example, an unauthorized use protection is released.

[14] Face search routine

Referring to Fig. 14, explanation will be given on the face search routine. Fig. 14 shows an example of images displayed when the face search routine is activated.

Firstly, as shown in Fig. 14A, the user selects whether to load a person through his/her face (680) or search a person through his/her face (681)

When the person loading is selected, as shown in Fig. 14B, an image entered from the camera is displayed (683) on the screen and when a desired person is captured, the user presses the enter button.

Next, as shown in Fig. 14C, the user enters various information such as a personal name, phone number, e-mail address, and a geographical address so as to be stored together with the captured image.

Moreover, when the person search is selected,

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as shown in Fig. 14D, an image entered from the camera is displayed (686) on the screen and when a desired person is captured, the user presses the enter button. an image identification is performed using the image
5 information of the persons stored in the memory and as shown in Fig. 14E, corresponding personal information is displayed on the screen.

According to the present invention, it is possible to place the main body having the display
10 screen at a place where the user can easily see the screen and move the camera device to the vicinity of an object to be captured, thereby easily take a picture of the object while confirming an image on the display screen. Moreover, by converting a captured image, for
15 example, into text data to be used as a phone number, Internet address, mail text, and other information, it is possible to easily use the calling function, the Internet connection, mail transmission, and other functions.

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